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Re: Progress Report (Type I)

The following progress report summarizes work accomplished for the 2-month period ending December 31, 1973 with reference to Article II, Item 3 of the contract schedule outlined in #NAS5-21839.

a. Remote Sensing in Iowa Agriculture (MMC #249).

b. GSFC Identification Number of the Principal Investigator (UN-611).

c. Any problems that are impeding the progress of the investigation:
No major problems are impeding the progress of this investigation at this time.

d. Accomplishments during this reporting period and those planned for the next reporting period:

i) Cropland identification and inventory

1) During the 1973 crop growing season, ERTS-1 successfully viewed three test sites in Iowa at different times depending primarily on the presence of cloud cover or atmospheric haze. Cloud-free imagery received was generally of good quality. One test site in northeastern Iowa was viewed only two times, June 13 and September 11. It appears that the other two test sites were viewed a sufficient number of critical times with respect to crop development to establish a crop calendar for separation of

most major crop types at these test sites. The crop types under consideration are corn, soybeans, alfalfa, oats and pasture.

2) The visual spectral response of known fields on enlarged black and white ERTS-1 imagery is being tabulated to determine the combinations of dates and MSS bands which are most useful for achieving a crop separation. Analysis of the 1972 ERTS-1 coverage of these test sites showed that a complete separation of all crops is not possible. In the analysis to date, only MSS bands 5 and 7 are useful for visual analysis.. Band 6 appears very similar to band 7, however, it is usually less distinct. In addition, the quality of each band appears to depend on seasonal crop development.

3) When the crop separation scheme in (2) is completed, acreage estimates will be attempted using visual and digital techniques. In conjunction with this, acreage estimates from underflight imagery have been established for all crops in 12 section areas at two test sites and for corn in a 36 section area in central Iowa.

4) ERTS-1 digital tapes covering central Iowa during May and August were recently received from NASA. This type of analysis is just beginning but we hope to use these tapes both multispectrally and temporally to achieve area estimates of major crop types at the central Iowa test site.

ii) Soils inventory

1) Study areas within the Clarion-Nicollet-Webster soil association area have been selected near Ames. Various types of remote sensing imagery are being evaluated for their value as a base map for soil surveys. Ground truth data consists of a recent 4-inch per mile soil map constructed using conventional black and white aerial photographs. A detailed soil map (1 inch per 100 feet) is also being used for ground truth for a 160-acre tract. Variation in imagery response due to changing soil properties and crop canopy during the growing season will be quantified.

2) A soil association map (1" = 23 miles) using ERTS imagery (band 7) as a base is being prepared.

iii) General

1) ERTS-1 imagery has been acquired which covers the entire state of Iowa during May and June of 1973. A first draft mosaic has been completed from this imagery using MSS band 7. This mosaic will be used for general land-use inventories of the natural resources of Iowa.

e. Discussion of significant results and their relationship to practical applications or operational problems: Analysis of 1972 single-date coverage indicated that a complete crop classification was not attainable at our test sites. Good multi-date coverage during 1973 indicates that many of the problems encountered in 1972 will be minimized. In addition, the compilation of spring-time imagery covering the entire state of Iowa has added a new dimension to interpretation of Iowa's natural resources. ERTS-1 has provided data necessary to achieve the broad synoptic view not attainable through other means. This should provide soils and crop researchers and land use planners a base map of Iowa. Granted and due to the resolution of ERTS-1, not all details are observable for many land use planning needs, but this gives a general and current view of Iowa.

f. There are no published articles, and/or papers, pre-prints, etc. at this time.

g. No recommendations concerning practical changes in operations are suggested at this time.

h. No additions to the standing order are requested at this time.

j. No data request forms have been submitted during this reporting period.